

CLAIMS

1. 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃.
2. 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃.
3. 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃.
4. 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃.
5. 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃.
6. 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃.
7. 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.
8. 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.
9. A pharmaceutical composition containing 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃ together with a pharmaceutically acceptable excipient.
10. The pharmaceutical composition of claim 9 containing 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃ in an amount of from about 0.01 μ g to about 100 μ g per gram of the composition.
11. The pharmaceutical composition of claim 9 containing 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.1 μ g to about 50 μ g per gram of the composition.
12. The pharmaceutical composition of claim 9 suitable for oral administration.
13. The pharmaceutical composition of claim 9 suitable for topical administration.
14. The pharmaceutical composition of claim 9 suitable for parenteral administration.
15. A pharmaceutical composition containing 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃ together with a pharmaceutically acceptable excipient.
16. The pharmaceutical composition of claim 15 containing 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.01 μ g to about 100 μ g per gram of the composition.

17. The pharmaceutical composition of claim 15 containing 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.1 μ g to about 50 μ g per gram of the composition.

18. The pharmaceutical composition of claim 15 suitable for oral administration.

19. The pharmaceutical composition of claim 15 suitable for topical administration.

20. The pharmaceutical composition of claim 15 suitable for parenteral administration.

21. A pharmaceutical composition containing 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃ together with a pharmaceutically acceptable excipient.

22. The pharmaceutical composition of claim 21 containing 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.01 μ g to about 100 μ g per gram of the composition.

23. The pharmaceutical composition of claim 21 containing 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.1 μ g to about 50 μ g per gram of the composition.

24. The pharmaceutical composition of claim 21 suitable for oral administration.

25. The pharmaceutical composition of claim 21 suitable for topical administration.

26. The pharmaceutical composition of claim 21 suitable for parenteral administration.

27. A pharmaceutical composition containing 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃ together with a pharmaceutically acceptable excipient.

28. The pharmaceutical composition of claim 27 containing 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.01 μ g to about 100 μ g per gram of the composition.

29. The pharmaceutical composition of claim 27 containing 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.1 μ g to about 50 μ g per gram of the composition.

30. The pharmaceutical composition of claim 27 suitable for oral administration.

31. The pharmaceutical composition of claim 27 suitable for topical administration.

32. The pharmaceutical composition of claim 27 suitable for parenteral administration.

33. A pharmaceutical composition containing 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃ together with a pharmaceutically acceptable excipient.

34. The pharmaceutical composition of claim 33 containing 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.01 μ g to about 100 μ g per gram of the composition.

35. The pharmaceutical composition of claim 33 containing 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.1 μ g to about 50 μ g per gram of the composition.

36. The pharmaceutical composition of claim 33 suitable for oral administration.

37. The pharmaceutical composition of claim 33 suitable for topical administration.

38. The pharmaceutical composition of claim 33 suitable for parenteral administration.

39. A pharmaceutical composition containing 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃ together with a pharmaceutically acceptable excipient.

40. The pharmaceutical composition of claim 39 containing 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.01 μ g to about 100 μ g per gram of the composition.

41. The pharmaceutical composition of claim 39 containing 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.1 μ g to about 50 μ g per gram of the composition.

42. The pharmaceutical composition of claim 39 suitable for oral administration.

43. The pharmaceutical composition of claim 39 suitable for topical administration.

44. The pharmaceutical composition of claim 39 suitable for parenteral administration.

45. A pharmaceutical composition containing 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃ together with a pharmaceutically acceptable excipient.

46. The pharmaceutical composition of claim 45 containing 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.01 μ g to about 100 μ g per gram of the composition.

47. The pharmaceutical composition of claim 45 containing 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.1 μ g to about 50 μ g per gram of the composition.

48. The pharmaceutical composition of claim 45 suitable for oral administration.

49. The pharmaceutical composition of claim 45 suitable for topical administration.

50. The pharmaceutical composition of claim 45 suitable for parenteral administration.

51. A pharmaceutical composition containing 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃ together with a pharmaceutically acceptable excipient.

52. The pharmaceutical composition of claim 51 containing 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.01 μ g to about 100 μ g per gram of the composition.

53. The pharmaceutical composition of claim 51 containing 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃ in an amount from about 0.1 μ g to about 50 μ g per gram of the composition.

54. The pharmaceutical composition of claim 51 suitable for oral administration.

55. The pharmaceutical composition of claim 51 suitable for topical administration.

56. The pharmaceutical composition of claim 51 suitable for parenteral administration.

57. A method of treating a metabolic bone disease where it is desired to maintain or increase bone mass comprising administering to a patient with said disease an effective amount of a compound selected from the group consisting of

- 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

58. The method of claim 57 where the disease is senile osteoporosis.

59. The method of claim 57 where the disease is postmenopausal osteoporosis.

60. The method of claim 57 where the disease is steroid-induced osteoporosis.

61. The method of claim 57 where the disease is low bone turnover osteoporosis.

62. The method of claim 57 where the disease is osteomalacia.

63. The method of claim 57 where the disease is renal osteodystrophy.

64. The method of claim 57 wherein the compound is administered orally.

65. The method of claim 57 wherein the compound is administered parenterally.

66. The method of claim 57 wherein the compound is administered transdermally.

67. The method of claim 57 wherein the compound is administered in a dosage of from about 0.01 μ g to about 50 μ g per day.

68. The method of claim 57 wherein the compound is 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃.

69. The method of claim 57 wherein the compound is 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃.

70. The method of claim 57 wherein the compound is 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃.

71. The method of claim 57 wherein the compound is 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃.

72. The method of claim 57 wherein the compound is 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃.

73. The method of claim 57 wherein the compound is 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃.

74. The method of claim 57 wherein the compound is 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

75. The method of claim 57 wherein the compound is 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

76. A method of treating psoriasis comprising administering to a patient with psoriasis an effective amount of a compound selected from the group consisting of

19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and

19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

77. The method of claim 76 wherein said effective amount comprises about 0.1 μ g/day to about 100 μ g/day of said compound.

78. The method of claim 76 wherein the compound is 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃.

79. The method of claim 76 wherein the compound is 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃.

80. The method of claim 76 wherein the compound is 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃.

81. The method of claim 76 wherein the compound is 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃.

82. The method of claim 76 wherein the compound is 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃.

83. The method of claim 76 wherein the compound is 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃.

84. The method of claim 76 wherein the compound is 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

85. The method of claim 76 wherein the compound is 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

86. A method of treating a cancerous disease comprising administering to a patient with said disease an effective amount of a compound selected from the group consisting of

19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and

19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

87. The method of claim 86 where the disease is leukemia.

88. The method of claim 86 where the disease is colon cancer.

89. The method of claim 86 where the disease is breast cancer.

90. The method of claim 86 where the disease is prostate cancer.

91. The method of claim 86 wherein the compound is administered orally.

92. The method of claim 86 wherein the compound is administered parenterally.

93. The method of claim 86 wherein the compound is administered transdermally.

94. The method of claim 86 wherein the compound is administered in a dosage of from about 0.01 μ g to about 100 μ g per day.

95. The method of claim 86 wherein the compound is 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃.

96. The method of claim 86 wherein the compound is 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃.

97. The method of claim 86 wherein the compound is 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃.

98. The method of claim 86 wherein the compound is 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃.

99. The method of claim 86 wherein the compound is 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃.

100. The method of claim 86 wherein the compound is 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃.

101. The method of claim 86 wherein the compound is 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

102. The method of claim 86 wherein the compound is 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

103. A method of treating a disease characterized by an imbalance in the immune system comprising administering to a patient with said disease an effective amount of a compound selected from the group consisting of

19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,

19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and

19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

104. The method of claim 103 where the disease is multiple sclerosis.

105. The method of claim 103 where the disease is diabetes mellitus.

106. The method of claim 103 where the disease is transplant rejection.

107. The method of claim 103 where the disease is lupus.

108. The method of claim 103 where the disease is atherosclerosis.

109. A method of treating rheumatoid arthritis comprising administering to a patient with rheumatoid arthritis an effective amount of a compound selected from the group consisting of

- 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and
- 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

110. A method of treating alopecia comprising administering to a patient with alopecia an effective amount of a compound selected from the group consisting of

- 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and
- 19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

111. The method of claim 110 wherein said alopecia is chemically induced alopecia.

112. A method of treating skin conditions selected from the group consisting of dermatitis, eczema, keratosis, lack of skin firmness, wrinkles, lack of dermal hydration and insufficient sebum secretion which comprises administering to a patient by topical, oral or parenteral means an effective amount of a compound selected from the group consisting of

- 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
- 19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,

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19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and
19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

113. A method of treating hypertension comprising administering to a patient with hypertension an effective amount of a compound selected from the group consisting of

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19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and
19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

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114. A method of treating hypocalcemia comprising administering to a patient with hypocalcemia an effective amount of a compound selected from the group consisting of

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19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and
19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

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115. A method of treating hypoparathyroidism comprising administering to a patient with hypoparathyroidism an effective amount of a compound selected from the group consisting of

5 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
10 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and
19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.

116. A method of treating inflammatory bowel disease comprising administering to a patient with inflammatory bowel disease an effective amount of a compound selected from the group consisting of

5 19-nor-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-20(S)-2 α -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-20(S)-2 β -ethyl-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(E)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
19-nor-2(Z)-ethylidene-1 α ,25-dihydroxyvitamin D₃,
10 19-nor-2(E)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃, and
19-nor-2(Z)-ethylidene-20(S)-1 α ,25-dihydroxyvitamin D₃.